

NOVEMBER/DECEMBER 2024

**23PPH23 — ELECTROMAGNETIC THEORY**



Time : Three hours

Maximum : 75 marks

SECTION A — ( $10 \times 2 = 20$  marks)

Answer ALL questions.

1. Define electrostatic potential and its significance.
2. Give short note on uniqueness theorem in electrostatics.
3. Illustrate the magnetic vector potential.
4. What is Ampere's circuital law?
5. Outline the Maxwell's displacement current.
6. Write the wave equation in electromagnetism.
7. What is linear polarization?
8. Mention the significance of reflection and refraction in wave propagation.
9. Summarize the plasma as the fourth state of matter.
10. Write the Boltzmann equation.

SECTION B — ( $5 \times 5 = 25$  marks)

Answer ALL questions.

11. (a) Discuss the boundary value problems in electrostatics and their importance.

Or

- (b) Explain the process of solving Laplace's equation in spherical coordinates.

12. (a) List out the application of Ampere's law in calculating magnetic fields.

Or

- (b) Discuss the process of calculating the magnetic field of a localized current distribution.

13. (a) List out the applications of Maxwell's equations in non-conducting media.

Or

- (b) Explain the process of solving the wave equation for plane waves.

14. (a) Discuss the application of waveguides in optical fiber communications.

Or

- (b) Explain the process of wave propagation in a conducting medium.

15. (a) Elaborate the application of the Boltzmann equation in plasman physics.

Or

- (b) Give a short note on the process of radiation from a localized source.

SECTION C — ( $3 \times 10 = 30$  marks)

Answer any THREE questions.

16. Explain of how molecular polarizability affects dielectric properties.

17. Criticize the role of magnetic vector potential in magnetostatics and applications.

18. Elaborate the role of Maxwell's equations in describing electromagnetic wave propagation.

19. How the inhomogeneous wave equation is solved and give its implications?

20. Compile the role of the Boltzmann equation in plasma physics and its applications.

